

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Bitler et al	<u>Parent Application</u>
Application No.	not yet known	Group Art Unit 1924
Filed;	herewith	Examiner: T. Yoon
Title:	Polymeric Modifying Agents	
(Divisional of Serial No. 09/216,640, filed December 16, 1998)		

Assistant Commissioner for Patents  
Washington D.C. 20261

PRELIMINARY AMENDMENT

Sir:

INTRODUCTION

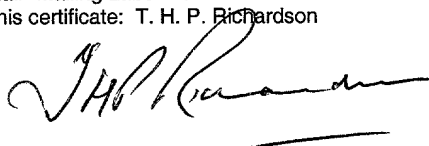
Before examining this application and before calculating the filing fee, please amend it as follows.

AMENDMENTS

Please amend this application as follows:

EXPRESS MAIL CERTIFICATION (37 CFR 1.10)

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Signature



In the Specification

- Page 1, lines 6-7      replace" This application is related to application Serial No. 08/639,724 filed March 7, 1995 by Steven P. Bitler and Ray F. Stewart and" by
- This application is a divisional of copending, commonly assigned Application Serial No. 09/216,640, filed December 16, 1998, by Bitler, Stewart, Wanthal, Kamp, Meyers, Taft and Schultz (Docket No. 10762-8). Serial No. 09/216,640 is a continuation of Application Serial No. 08/920,161, filed September 12, 1996, now abandoned (Docket No. 10762-4), and a continuation-in-part of
- (1)      Application Serial No. 08/726,763, filed October 15, 1996, by Bitler and Stewart, now abandoned (Docket No. 10762-5) , which is a file wrapper continuation of Application Serial No. 08/639,724, filed March 7, 1995, now abandoned (Docket No. 10762);
  - (2)      Application Serial No. 08/726,739, filed October 15, 1996, by Bitler and Stewart, now abandoned (Docket No. 10762-6), which is a continuation of Application Serial No. 08/624,688, filed May 19, 1995, now abandoned (Docket No. 10762-1), which is also a continuation of Application Serial No. 08/639,724, filed March 7, 1995, now abandoned (Docket No. 10762); and
  - (3)      Application Serial No. 08/726,764, filed October 15, 1996, by Bitler and Stewart (Docket No. 10762-7), now abandoned, which is a file wrapper continuation of Application Serial No. 08/628,685, filed May 24, 1995, now abandoned (Docket No. 10762-2), which is also a continuation of Application Serial No. 08/639,724, filed March 7, 1995.
- This application also --
- Page 8, line 38      replace "comprisesforming" by --comprises forming - -
- Page 9, line 16-17      replace    "DSC calorimeter (at a rate of temperature change of 10 °C./min)."    by    -- differential scanning calorimeter (DSC), at a rate

of temperature change of 10 °C./min.  $T_o$  and  $T_p$  are measured in the conventional way well known to those skilled in the art. Thus  $T_p$  is the temperature at the peak of the DSC curve, and  $T_o$  is the temperature at the intersection of the baseline of the DSC peak and the onset line, the onset line being defined as the tangent to the steepest part of the DSC curve below  $T_p$ . - -

Page 10, line 9

after "polyphenolics." insert

- - The term "unsaturated polyester" is used in this specification in its conventional sense to mean a polymer in which the monomer units are linked to each other through an ester group and which contains carbon-carbon double bonds that are capable of undergoing further polymerization. The term "vinyl ester" is likewise used in its conventional sense to denote a subclass of the unsaturated polyesters, namely those which contain vinyl groups, in particular polymers made by addition reactions involving epoxides and acids. In order to prepare crosslinked thermoset resins from these polymers, they are generally dissolved in a monomer such as styrene and then copolymerized with the monomer. - -

Page 17, line 2

after "cobalt," insert --copper, --

Page 17, line 3

replace "lead, or copper" by -- or lead --

Page 32, line 15

After "Table 2" insert - - , the amount of AMZ being sufficient to give a product containing 13% AMZ - -

Page 35, Table 2

In the column headed "2" and in the line commencing "AMZ", replace "-" by - - \* - -

Page 35, after Table 2

Insert - - \* an amount sufficient to give a product containing 13% AMZ. - -

In the Claims

1. (Amended) A composition which comprises
  - (1) a matrix material; and
  - (2) **[distributed in the matrix material, or adjacent to the matrix material,]** a modifying agent which
    - (a) comprises
      - (i) a polymeric moiety **[ingredient]** which comprises a crystalline polymeric moiety having an onset of melting temperature  $T_O$  and a peak melting temperature  $T_P$  such that  $T_P - T_O$  is less than  $T_P^{0.7}$ ; and
      - (ii) **[an active chemical ingredient]** a catalytic moiety which, when in contact with **[a]** the matrix material at an elevated temperature, catalyzes **[promotes or inhibits]** a chemical reaction of the matrix material, and
    - (b) is in the form of **[a solid which, when exposed to a change in a variable selected from temperature, concentration of a solvent, electromagnetic radiation, ultrasonic radiation, and pH, undergoes a physical change which causes the modifying agent to lose its physical integrity and increases the extent to which the matrix material is contacted by the active chemical moiety, said solid form being selected from**
      - (i) **]** solid particles which
        - (i) have some of the active chemical moieties on the surface of the particles and the other active chemical moieties hidden within the particles,
        - (ii) are distributed in the matrix material,

(iii) have [and which have one or more of the following characteristics (a)] an average particle size of [0.1 to] less than 150 micron, and

(iv) when heated above  $T_p$ , undergo a physical change which (A) substantially increases the extent to which the matrix material is contacted by the catalytic moiety and (B) causes the chemical reaction of the matrix material to take place.

[(b) a polymeric ingredient having a heat of fusion of at least 20 J/g, and

(c) a polymeric ingredient in which the crystalline polymeric moiety is a side chain crystalline polymer, and

(ii) a film which is in contact with the matrix material.]

Cancel claims 2-9

Add the following new claims 10-109

10. A composition according to Claim 1 which also contains a coadditive which contains

- (i) one or more non-polar groups which are alkyl, fluoroalkyl or alkyl styrene groups in which the alkyl groups contain at least 6 carbon atoms, and
- (ii) one or more polar groups which are epoxy, hydroxyl, carboxyl, amino, ammonium, ether, ester, amide, sulfonamide, sulfonic acid, sulfonic acid salt or phosphate groups.

11. A composition according to Claim 1 wherein the modifying agent contains polar groups and the matrix material contains polar groups.

12. A composition according to Claim 1 wherein

- (a) the matrix material comprises precursors for a thermoset polymer; and
- (b) the catalytic moiety is a catalyst for reaction of said precursors to form the thermoset polymer.

13. A composition according to Claim 12 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.

14. A composition according to Claim 1 wherein

- (a) the matrix material comprises an unsaturated polyester which will undergo a crosslinking reaction when exposed to a metal-containing catalyst; and
- (b) the catalytic moiety is a metal-containing compound which is a catalyst for said crosslinking reaction.

15. A composition according to Claim 14 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.

16. A composition according to Claim 1 wherein

- (a) the matrix material comprises a vinyl ester which will undergo a crosslinking reaction when exposed to a metal-containing catalyst; and
- (b) the catalytic moiety is a metal-containing compound which is a catalyst for said crosslinking reaction.

17. A composition according to Claim 16 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.

18. A composition according to Claim 1 wherein

- (a) the matrix material comprises chemical compounds which will undergo reaction together when exposed to a metal-containing catalyst to form a polyurethane; and
- (b) the catalytic moiety is a metal-containing compound which is a catalyst for said reaction.

19. A composition according to Claim 18 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.
20. A composition according to Claim 1 wherein
- (a) the matrix material comprises chemical compounds which will undergo reaction together when exposed to a metal-containing catalyst to form a polyurea; and
  - (b) the catalytic moiety is a metal-containing compound which is a catalyst for said reaction.
21. A composition according to Claim 20 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.
22. A composition according to Claim 1 wherein
- (a) the matrix material comprises chemical compounds which will undergo reaction together when exposed to a metal-containing catalyst to form a polyisocyanurate; and
  - (b) the catalytic moiety is a metal-containing compound which is a catalyst for said reaction.
23. A composition according to Claim 22 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.
24. A composition according to Claim 1 wherein
- (a) the matrix material comprises epoxy resin precursors which will undergo reaction together when exposed to a catalyst to form an epoxy resin; and
  - (b) the catalytic moiety is a catalyst for said reaction.
25. A composition according to Claim 24 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.

26. A composition according to Claim 1 wherein
- (a) the matrix material will undergo chemical reaction when exposed to an azo initiator; and
  - (b) the catalytic moiety contains an azo group.
27. A composition according to Claim 26 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.
28. A composition according to Claim 1 wherein
- (a) the matrix material will undergo chemical reaction when exposed to a peroxy initiator; and
  - (b) the catalytic moiety i contains a peroxy group.
29. A composition according to Claim 28 wherein the crystalline polymer in the polymeric moiety comprises a side chain crystalline polymer.
30. A composition which comprises
- (1) a matrix material; and
  - (2) a modifying agent which
    - (a) comprises
      - (i) a polymeric moiety which comprises a crystalline polymeric moiety having an onset of melting temperature  $T_O$  and a peak melting temperature  $T_P$  such that  $T_P - T_O$  is less than  $T_P^{0.7}$ ; and
      - (ii) a catalytic moiety which is bonded to the polymeric moiety through a bond having a strength of at least 10 Kcal/mole, and which, when in contact with the matrix material at an elevated temperature, catalyzes a chemical reaction of the matrix material, and
    - (b) is in the form of solid particles which



- (i) are distributed in the matrix material,
- (ii) have an average particle size of less than 150 micron, and
- (iii) when heated above  $T_p$ , undergo a physical change which
  - (A) substantially increases the extent to which the matrix material is contacted by the catalytic moiety and
  - (B) causes the chemical reaction of the matrix material to take place.

31. A composition according to claim 30 wherein the modifying agent is in the form of particles having an average particle size of 0.1 to 50 micron.

32. A composition according to claim 30 wherein the polymeric moiety comprises a side chain crystalline polymeric moiety.

33. A composition according to claim 32 wherein the side chain crystalline polymeric moiety comprises units derived from one or more monomers comprising an n-alkyl group containing 12 to 50 carbon atoms.

34. A composition according to claim 54 wherein said units are derived from an n-alkyl acrylate, n-alkyl methacrylate, n-alkyl acrylamide or n-alkyl methacrylamide.

35. A composition according to claim 32 wherein the modifying agent is present in the form of solid particles which have an average diameter of 0.1 to 25 microns.

36. A composition according to claim 32 wherein the side chain crystalline polymeric moiety has a crystalline melting point of 50 to 100°C.

37. A composition according to claim 32 wherein the modifying agent has a number average molecular weight of 1,000 to 50,000.

38. A composition according to claim 30 wherein the solid particles have some of the active chemical moieties on the surface of the particles and the other active chemical moieties hidden within the particles.
39. A composition according to claim 30 wherein the matrix material is liquid, and which (i) can be stored at 40 °C. for 6 months without doubling in viscosity and (ii), when heated to a temperature substantially over  $T_p$ , will cure in less than 1 hour to a composition which will not flow.
40. A composition according to claim 30 wherein  $T_p - T_0$  is less than 10 °C.
41. A composition according to claim 30 wherein the catalytic moiety comprises a metal.
42. A composition according to claim 41 wherein the catalytic moiety comprises tin.
43. A composition according to claim 41 wherein the catalytic moiety comprises a transition metal.
44. A composition according to claim 41 wherein the catalytic moiety comprises a main group metal selected from aluminum, tin and lead.
45. A composition according to claim 30 wherein the catalytic moiety comprises an amine group.
46. A composition according to claim 30 wherein the catalytic moiety comprises an enzyme.
47. A composition according to claim 30 wherein the catalytic moiety comprises a carboxyl or sulfonate group.

48. A composition according to claim 30, wherein the crystalline polymeric moiety has a heat of fusion, as measured by a differential scanning calorimeter (DSC), of at least 20 J/g.

49. A composition according to claim 30, wherein the particles of the modifying agent have an average particle size of 0.1 to 150 microns.

50. A composition according to claim 41, wherein the crystalline polymeric moiety has a heat of fusion, as measured by a differential scanning calorimeter (DSC), of at least 20 J/g.

51. A composition according to claim 30, wherein the matrix material provides a continuous liquid phase.

73. A composition according to claim 30, wherein the matrix material provides a continuous solid phase.

53. A composition according to claim 30, wherein the matrix material is in the form of particles which are blended with the particles of modifying agent.

54. A composition which comprises

- (1) a matrix material which comprises precursors for a crosslinked thermoset epoxy resin; and
- (2) a modifying agent which
  - (a) comprises
    - (i) a polymeric moiety which has a heat of fusion, as measured by a differential scanning calorimeter (DSC), of at least 20 J/g and which comprises a side chain crystalline polymeric moiety having an onset of melting temperature  $T_O$  and a peak melting temperature  $T_P$  such that  $T_P - T_O$  is less than  $T_P^{0.7}$  and less than 10 °C.; and

- (ii) a catalytic moiety which is bonded to the polymeric moiety through a bond having a strength of at least 10 Kcal/mole, and which, when in contact with the matrix material at an elevated temperature, catalyzes chemical reaction of the matrix material to form the thermoset epoxy resin, and
- (b) is in the form of solid particles which
  - (i) are distributed in the matrix material,
  - (ii) have an average particle size of less than 150 microns, and
  - (iii) when heated above  $T_p$ , undergo a physical change which
    - (A) substantially increases the extent to which the matrix material is contacted by the catalytic moiety and
    - (B) causes the chemical reaction of the matrix material to form the thermoset epoxy resin.

55. A composition according to claim 54 wherein the modifying agent is in the form of particles having an average particle size of 0.1 to 50 microns.

56. A composition according to claim 54 wherein the side chain crystalline polymeric moiety comprises units derived from one or more monomers comprising an n-alkyl group containing 12 to 50 carbon atoms.

57. A composition according to claim 54 wherein said units are derived from an n-alkyl acrylate, n-alkyl methacrylate, n-alkyl acrylamide or n-alkyl methacrylamide.

58. A composition according to claim 54 wherein the polymeric moiety comprises a thermoplastic elastomer.

59. A composition according to claim 54 wherein the modifying agent is present in the form of solid particles which have an average diameter of 0.1 to 25 microns.

60. A composition according to claim 54 wherein the side chain crystalline polymeric moiety has a crystalline melting point of 50 to 100°C.
61. A composition according to claim 54 wherein the modifying agent has a number average molecular weight of 1,000 to 50,000.
62. A composition according to claim 54 wherein the matrix material is liquid, and which (i) can be stored at 40°C. for 6 months without doubling in viscosity and (ii), when heated to a temperature substantially over  $T_p$ , will cure in less than 1 hour to a composition which will not flow.
63. A composition according to claim 54 wherein  $T_p - T_0$  is less than 10°C.
64. A composition according to claim 54 wherein the catalytic moiety comprises a metal or a metal-containing group.
65. A composition according to claim 64 wherein the catalytic moiety comprises a transition metal.
66. A composition according to claim 54 wherein the catalytic moiety comprises an imidazole.
67. A composition according to claim 54 wherein the catalytic moiety comprises an amine group.
68. A composition according to claim 54 wherein the catalytic moiety comprises a carboxyl or sulfonate group.
69. A composition according to claim 54, wherein the particles of the modifying agent have an average particle size of 0.1 to 150 microns.

70. A composition according to claim 54, wherein the matrix material provides a continuous liquid phase.

92. A composition according to claim 54, wherein the matrix material provides a continuous solid phase.

72. A composition according to claim 54, wherein the matrix material is in the form of particles which are blended with the particles of modifying agent.

73. A composition which comprises

- (1) a matrix material which comprises precursors for a crosslinked thermoset polyurethane resin; and
- (2) a modifying agent which
  - (a) comprises
    - (i) a polymeric moiety which has a heat of fusion, as measured by a differential scanning calorimeter (DSC), of at least 20 J/g and which comprises a side chain crystalline polymeric moiety having an onset of melting temperature  $T_O$  and a peak melting temperature  $T_p$  such that  $T_p - T_O$  is less than  $T_p^{0.7}$  and less than  $10^\circ\text{C}$ .; and
    - (ii) a catalytic moiety which is bonded to the polymeric moiety through a bond having a strength of at least 10 Kcal/mole, and which, when in contact with the matrix material at an elevated temperature, catalyzes a chemical reaction of the matrix material to form the thermoset polyurethane resin, and
  - (b) is in the form of solid particles which
    - (i) are distributed in the matrix material,
    - (ii) have an average particle size of less than 150\_micron, and
    - (iii) when heated above  $T_p$ , undergo a physical change which

- (A) substantially increases the extent to which the matrix material is contacted by the catalytic moiety and
- (Bi) causes the chemical reaction of the matrix material to form the thermoset polyurethane resin.

74. A composition according to claim 73 wherein the modifying agent is in the form of particles having an average particle size of 0.1 to 50 microns.

75. A composition according to claim 73 wherein the side chain crystalline polymeric moiety comprises units derived from one or more monomers comprising an n-alkyl group containing 12 to 50 carbon atoms.

76. A composition according to claim 75 wherein said units are derived from an n-alkyl acrylate, n-alkyl methacrylate, n-alkyl acrylamide or n-alkyl methacrylamide.

77. A composition according to claim 75 wherein the polymeric moiety comprises a thermoplastic elastomer.

78. A composition according to claim 73 wherein the modifying agent is present in the form of solid particles which have an average diameter of 0.1 to 25 microns.

79. A composition according to claim 73 wherein the side chain crystalline polymeric moiety has a crystalline melting point of 50 to 100°C.

80. A composition according to claim 73 wherein the modifying agent has a number average molecular weight of 1,000 to 50,000.

81. A composition according to claim 73 wherein the matrix material is liquid, and which (i) can be stored at 40 °C. for 6 months without doubling in viscosity and (ii), when heated to a temperature substantially over  $T_p$ , will cure in less than 1 hour to a composition which will not flow.

82. A composition according to claim 73 wherein  $T_p - T_o$  is less than  $10^{\circ}\text{C}$ .
83. A composition according to claim 73 wherein the catalytic moiety comprises a metal or a metal-containing group.
84. A composition according to claim 83 wherein the catalytic moiety comprises tin.
85. A composition according to claim 83 wherein the catalytic moiety comprises a transition metal.
86. A composition according to claim 83 wherein the catalytic moiety comprises a main group metal selected from aluminum, tin and lead.
87. A composition according to claim 73 which forms a foamed thermoset resin when it is heated.
88. A composition according to claim 73, wherein the particles of the modifying agent have an average particle size of 0.1 to 150 microns.
89. A composition according to claim 73, wherein the matrix material provides a continuous liquid phase.
90. A composition according to claim 73, wherein the matrix material provides a continuous solid phase.
91. A composition according to claim 73, wherein the matrix material is in the form of particles which are blended with the particles of modifying agent.



92. A composition which comprises

- (1) a matrix material which comprises precursors for a crosslinked thermoset resin; and
- (2) a modifying agent which
  - (a) comprises
    - (i) a polymeric moiety which has a heat of fusion, as measured by a differential scanning calorimeter (DSC), of at least 20 J/g and which comprises a side chain crystalline polymeric moiety having an onset of melting temperature  $T_O$  and a peak melting temperature  $T_P$  which is no more than 85 °C and such that  $T_P - T_O$  is less than  $T_P^{0.7}$ ; and
    - (ii) a catalytic moiety which contains an amine group, which is bonded to the polymeric moiety through a covalent bond having a strength of at least 10 Kcal/mole, and which, when in contact with the matrix material at an elevated temperature, catalyzes a chemical reaction of the matrix material to form the thermoset resin, and
  - (b) is in the form of solid particles which
    - (i) are distributed in the matrix material,
    - (ii) have an average particle size of 0.1 to 50 micron, and
    - (iii) when heated above  $T_P$ , undergo a physical change which
      - (A) substantially increases the extent to which the matrix material is contacted by the catalytic moiety and
      - (B) causes the chemical reaction of the matrix material to form the thermoset resin.

93. A composition according to claim 92, wherein the side chain crystalline polymeric moiety comprises 40 to 100% of units derived from an alkyl acrylate in which the alkyl group contains 12 to 50 carbon atoms, 0 to 20% of units derived from an alkyl acrylate in which the alkyl group contains 4 to 12 carbon atoms, and 0 to 15% of units derived

from at least one polar group selected from group consisting of acrylic acid, methacrylic acid, itaconic acid, acrylamide, methacrylamide, acrylonitrile, methacrylonitrile, vinyl acetate and N-vinyl pyrrolidone.

94. A composition according to claim 92, wherein the side chain crystalline polymeric moiety consists essentially of 40 to 100% of units derived from the alkyl acrylate in which the alkyl group contains 22 carbon atoms and 0 to 15% of units derived from acrylic acid.

95. A composition which comprises

- (1) a matrix material; and
- (2) a modifying agent which
  - (a) comprises
    - (i) a polymeric ingredient which comprises a crystalline polymeric moiety having an onset of melting temperature  $T_0$  and a peak melting temperature  $T_p$  such that  $T_p - T_0$  is less than  $T_p^{0.7}$ , and
    - (ii) a catalytic ingredient which is physically but not chemically bound to the polymeric ingredient, and which, when in contact with the matrix material at an elevated temperature, catalyzes a chemical reaction of the matrix material, and
  - (b) is in the form of solid particles which
    - (i) have some of the active chemical moieties on the surface of the particles and the other active chemical moieties hidden within the particles
    - (ii) are distributed in the matrix material,
    - (iii) have an average particle size of less than the 150 micron, and
    - (iv) when heated above  $T_p$ , undergo a physical change which

- (A) substantially increases the extent to which the matrix material is contacted by the catalytic ingredient, and
- (b) causes the chemical reaction of the matrix material to take place.

96. A composition according to claim 95 which also contains a coadditive which contains (i) one or more non-polar groups which are alkyl, fluoroalkyl, or alkyl styrene groups in which the alkyl groups contain at least 6 carbon atoms, and (ii) one or more polar groups which are epoxy, hydroxyl, carboxyl, amino, ammonium, ether, ester, amide, sulfonamide, sulfonic acid, sulfonic acid salt or phosphate groups.

97. A composition according to claim 95 wherein the modifying agent contains polar groups and the matrix material contains polar groups.

98. A composition according to claim 95 wherein the modifying agent is in the form of solid particles which are dispersed in a continuous solid or liquid phase of the matrix material.

99. A composition according to claim 98 wherein

- (a) the matrix material comprises an unsaturated polyester which will undergo a crosslinking reaction when exposed to a metal-containing catalyst; and
- (c) the catalytic ingredient is a metal-containing compound which is a catalyst for said crosslinking reaction.

100. A composition according to claim 99 wherein the polymeric ingredient is a side chain crystalline polymer, and both the side chain crystalline polymer and the metal-containing compound contain a group selected from polar groups and long chain alkyl groups.

101. A composition according to claim 98 wherein
- (a) the matrix material comprises a vinyl ester which will undergo a crosslinking reaction when exposed to a metal-containing catalyst; and
  - (b) the catalytic ingredient is a metal-containing compound which is a catalyst for said crosslinking reaction.
102. A composition according to claim 101 wherein the polymeric ingredient is a side chain crystalline polymer
103. A composition according to claim 98 wherein
- (a) the matrix material comprises chemical compounds which will undergo reaction together to form a polyurethane, and
  - (b) the catalytic ingredient is a metal-containing compound which is a catalyst for said reaction.
104. A composition according to claim 103 wherein the polymeric ingredient is a side chain crystalline polymer
105. A composition according to claim 104 which forms a foamed product when subjected to a reaction injection molding process.
106. A composition according to claim 98 wherein
- (a) the matrix material comprises chemical compounds which will undergo reaction together to form a polyurea, and
  - (b) the catalytic ingredient is a metal-containing compound which is a catalyst for said reaction.
107. A composition according to claim 106 wherein the polymeric ingredient is a side chain crystalline polymer

108. A composition according to claim 98 wherein
- (a) the matrix material comprises chemical compounds which will undergo reaction together to form a polyisocyanurate, and
  - (b) the catalytic ingredient is a metal-containing compound which is a catalyst for said reaction.
109. A composition according to claim 108 wherein the polymeric ingredient is a side chain crystalline polymer.

A clean copy of the amended claims is attached.

#### REMARKS

#### THE AMENDMENTS

The amendments to the specification are substantially the same as those made in the parent application. The amendments to Pages 9 and 17 correct errors noted by the Examiner in the parent application. The amendments to Page 9 insert further information about the conventional way in which the values of  $T_o$  and  $T_p$  are measured. The amendments to page 10 insert the conventional meanings of the terms "unsaturated polyester" and "vinyl ester".

The Table below summarizes the salient features of the six independent claims in the claims as amended by this Preliminary Amendment (and, in the hope that it will assist the Examiner, of the allowed claims of the parent application). From this Table, it will be seen that all the claims in this divisional application, like the allowed claims in the parent application, are limited to the use of modifying agents which are in the form of particles which

- are distributed in the matrix material,
- have an average size of less than 150 micron,
- contain an active ingredient which is a catalyst for a chemical reaction of the matrix material, and

when heated above  $T_p$  undergo a physical change which increases the contact between the matrix material and the catalytic moiety and causes the chemical reaction to take place.

Claim 1 does not specify the nature of the bond between the polymeric moiety and the catalytic moiety, and thus covers modifying agents in which the bond may be either chemical or physical. Claims 30,54,73 and 92 specify that there is a bond having a strength of at least 10 Kcal/mole between the polymeric moiety and the catalytic moiety. Claim 95 is limited to modifying agents in which the bond between the polymeric moiety and the catalytic moiety is physical, but not chemical. Claims 1 and 95 contain a limitation that some of the active chemical moieties are on the surface of particles and the other active chemical moieties are hidden within the particles. This limitation has been inserted in order to ensure that the claims are clearly distinguished from latent catalyst in which the catalyst is completely surrounded and encapsulated by a protective polymeric layer. No such limitation is needed in the other independent claims, in view of their requirement that there is a bond having a strength of at least 10 Kcal/mole between the moieties.

CLAIM NO.	<u>MATRIX</u>	<u>MODIFYING AGENT</u>			
		Particl es	Bond	Polymer Ingredient.	Active Ingredient
77 in parent	precursors for crosslinked thermoset polyester resin	< 150	>10 Kcal/mole	SCC, H>20 $\Delta T < 10$ and $< T_p^{0.7}$	Any catalyst
239 in parent	precursors for any crosslinked thermoset resin	0.1-50	>10 Kcal/mole	SCC, H>20 $\Delta T < T_p^{0.7}$ $T_p < 85^\circ\text{C}$ .	Transition metal catalyst
1 in div'l	any	< 150	chemical or physical **	any polymer in which $\Delta T < T_p^{0.7}$	any catalyst
30 in div'l	any	< 150	>10 Kcal/mole	any polymer in which $\Delta T < T_p^{0.7}$	any catalyst
54 in div'l	precursors for crosslinked thermoset epoxy resin	< 150	>10 Kcal/mole	SCC, H>20, $\Delta T < 10$ and $< T_p^{0.7}$	any catalyst
73 in div'l	precursors for crosslinked thermoset polyurethane resin	< 150	>10 Kcal/mole	SCC, H>20, $\Delta T < 10$ and $< T_p^{0.7}$	any catalyst
92 in div'l	precursors for any crosslinked thermoset resin	0.1-50	covalent >10 Kcal/mole	SCC, H>20 $\Delta T < T_p^{0.7}$ $T_p < 85^\circ\text{C}$ .	amine catalyst
95 in div'l	any	< 150	physical ,not chemical **	any polymer in which $\Delta T < T_p^{0.7}$	any catalyst

\*\*Claim 1 includes, and claim 95 is limited to, modifying agents in which the bond between the polymeric moiety and the active chemical moiety is physical, not chemical. These claims require that some of the active chemical moieties are on the surface of particles, and the other active chemical moieties are hidden within the particles.

It is noted for the record that the restriction of the claims in this application has been made in order to expedite the prosecution of this application, and that Applicants intend to prosecute other claims of broad scope in one or more divisional applications.

The allowed claims in the parent application were initially rejected over Stewart, Scott and Encyclopedia, but then allowed. As discussed in detail in the parent application, there is no disclosure in Stewart of any SCC polymer having a catalytic moiety bonded thereto, and Stewart cannot properly be combined with Scott or Encyclopedia to make good this deficiency in Stewart. Like the allowed claims in the parent application, amended independent claims 54, 73 and 92 of this application are limited to polymeric moieties which are SCC polymers. Amended independent claims 1,

30 and 95 of this application are not limited to SCC polymers, but are limited to crystalline polymers having a sharp melting point such that  $(T_p - T_o)$  is less than  $T_p^{0.7}$ . Since Stewart likewise fails to disclose any other polymer having a catalytic moiety bonded thereto, it is submitted that each of the independent claims in this application is patentable over the prior art for the same reasons as the claims allowed in the parent application.

It is also noted

- (1) that independent amended claim 1 of this application is substantially the same as a combination of the allowed claim 1 of Serial No. 08/710, 161, and the allowed claim 5 of Serial No. 08/726,739, except that
  - (a) amended claim 1 of this application is broader than each of those allowed claims in specifying that the particle size is  $< 150$  micron, rather than  $0.1-150$  micron, and
  - (b) amended claim 1 of this application is narrower than each of those allowed claims in requiring that some of the active chemical moieties are on the surface of the particles and the other active chemical moieties are hidden within the particles;
- (2) that independent claim 30 in this application is substantially the same as allowed claim 14 in Serial No. 08/726,739, except that it specifies that the particle size is  $< 150$  micron, rather than  $0.1-150$  micron;
- (3) that independent claim 54 of this application is substantially the same as allowed claim 140 of Serial No. 08/726,739, except that it specifies that the particle size is  $< 150$  micron, rather than  $0.1-150$  micron;
- (4) that independent claim 73 of this application is substantially the same as allowed claim 156 in Serial No. 08/726,739, except that it specifies that the particle size is  $< 150$  micron, rather than  $0.1-150$  micron;
- (5) that amended claim 92 of this application is wholly within the scope of amended claim 1 of this application; and



- (6) that independent claim 95 of this application is substantially the same as allowed claim 1 of Serial No. 08/710,161, except that it specifies that the particle size is < 150 micron, rather than 0.1-150 micron.

### DISCLOSURE STATEMENT

A Disclosure Statement under 37 CFR 1.56 accompanies this Preliminary Amendment

### CONCLUSION

It is believe that this application is now in condition for allowance, and such action at an early date is earnestly requested. If, however, there are any outstanding points that could be usefully discussed by telephone, the Examiner is asked to call the undersigned.

Respectfully submitted,



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